

PROJECT NUMBER: 1720
PROJECT TITLE: Analytical Microscopy
PROJECT LEADER: V. L. Baliga
PERIOD COVERED: May, 1990

I. REDUCED SIDESTREAM/FILTRATION/PAPER TECHNOLOGY
(SANDERS, YI)

A. Objective: Examine the ultrastructure of selected cigarette papers, paper additives, and filtration materials in support of the paper technology project.

B. Results:

Chemical Powders: Twenty five magnesium-containing products that were prepared from magnesium methyl carbonate (MgMeCO_3) with the amounts of MgMeCO_3 and KOH varied and the reaction temperatures and reaction times varied were examined for structural and elemental differences. Five major particle types were identified from the samples. They included an acicular rod-shaped structure that resembled nesquehonite ($\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$), a spherical to ovoid cluster of platelets that resembled platelets of hydromagnesite ($\text{Mg}_3(\text{CO}_3)_4(\text{OH})_2 \cdot 4\text{H}_2\text{O}$), flattened platelets that resembled $\text{Mg}(\text{OH})_2$, equant particles in loosely packed clusters, and an 'amorphous' structure with little to no crystalline shape.

Papers: Two cigarette papers with different sources of Multifex MM CaCO_3 were examined to determine the structural differences of the two forms of CaCO_3 . The paper made with domestic CaCO_3 from Pfizer consisted of large aggregates that measured about $10\mu\text{m}$ in diameter while the imported CaCO_3 , used in Superslimes, was evenly dispersed throughout the paper and had fewer and smaller aggregates.⁶

C. Conclusions: The products synthesized from MgMeCO_3 that exhibited an amorphous structure tended to reduce sidestream smoke more than the products that were more crystalline in form.

D. Plans: Papers that were made with four crystalline types of MgMeCO_3 components - the acicular rod, the spherical platelet, the flat platelet, and the amorphous structure - will be examined to determine if the crystal shape found in the paper is similar to the dried powder, starting material.

E. References:

1. Sanders, K., "Examination of Three Mg Containing Particles," Memo to K. Podraza, April 17, 1990.
2. Sanders, K., Examination of Four Mg Containing Particles," Memo to K. Podraza, April 20, 1990.
3. Sanders, K., "Examination of Five Mg Containing Particles," Memo to K. Podraza, April 25, 1990.
4. Sanders, K., "Examination of Three Mg Containing Particles," Memo to K. Podraza, May 7, 1990.
5. Yi, G., "Various Forms of Dried Products from Magnesium Methyl Carbonate Reactants," Memo to K. Podraza, May 7, 1990.
6. Yi, G., "Comparisons of MM CaCO₃ Particles from Superslims and Pfizer Cigarette Papers," May, 17, 1990.

II. OPERATIONS SUPPORT (BALIGA)

A. **Objective:** Provide analytical support to operations.

B. **Results:**

Two samples of coated, menthol encapsulated pellets and one sample of coated, menthol encapsulated string were examined to determine the uniformity of the coating material. The coating material uniformly surrounded one set of pellets and the string while the second set of pellets was partially coated. The honeycomb interior of the string contained unit cells that were two to five times smaller than those in the interior of the pellets¹.

One washer gasket was examined and was found to contain Si and Mg and was fibrous in structure².

C. **References:**

1. Baliga, V., "Structural and Elemental Analysis of Coated, Encapsulated Menthol Pellets and Coated, Encapsulated Menthol String," Memo to J. Washington, April 27, 1990.
2. Baliga, V., P.M. Notebook #8412, p. 31.

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